

# WA-Trans Steering Committee Meeting

February 14, 2008
9:00 A.M. to 12:00 P.M.
Washington State Department of
Transportation
Eastern Region Headquarters
2714 N. Mayfair Street
Spokane, WA 99207-2090
Tami Griffin

#### Facilitator / Note Taker:

## Agenda:

I.	Introductions, Status Questions, Time Tracking, Action Item Review
II.	Points in the WA-Trans Database
III.	Change Detection Requirements for Data Providers and Data Users
IV.	Use of Dates in the WA-Trans Database
V.	Definitions (WA-Trans Dictionary Draft Version) Review
VI.	Portals Report
VII.	Translation Out of WA-Trans Report
III.	Close, Next Meeting

#### Attendees:

Member	Association	Representing
Michelle Blake	WSDOT GIS Data Steward	WA-Trans Project
Dave Cullom	WA. Utilities & Transportation Commission	Rail And Utility Needs
Jeff Foisy	Washington Dept. of Fish and Wildlife	Washington Natural Resources
Holly Glaser	WSDOT Geographic Services	WA-Trans (GIS Analyst)
David Goldish	Seattle	WA-Trans (Tech Writer / Contractor)
Tami Griffin	WSDOT Geographic Services	WA-Trans (Project Manager), Facilitator
Dave Rideout	Spokane County Engineers Office	East side local government

Allyson Jason	U.S. Geological Survey	The National Map
Michael Leierer	WSDOT Geographic Services	WA-Trans (Assistant Project Manager/ Technical Lead)
Мас МсКау	Seattle	Dept. of Natural Resources (DNR)
Andy Norton	Puget Sound Regional Council	MPO and RTPO
Ian Von Essen	Spokane County GIS	E-911
Pat Whittaker	WSDOT Transportation Data Office	WSDOT Transportation Data Office

## Not Attending:

Member	Association	Representing
Tareq Al-Zeer	WSDOT NW Region Maintenance Engineer	WSDOT
Chuck Buzzard	Pierce County GIS	Local Govt. GIS
Michael Fallon	Bureau of Land Management	Bureau of Land Management
Wendy Hawley	Census Bureau	US Bureau of Census
Kathy O'Shea	Country Road Administration Board	County Road Administration Board
Lurleen Smith	Mason County Public Works	West Side Local Government
Elizabeth Stratton	WSDOT	Freight Interests

# I. <u>Introductions, Status Questions, Time Tracking, Action Item</u> Review

Bob Grabhorn was introduced as the new contractor involved with the WA-Trans Project. Jeff Foisy joined as the new representative for the Washington Dept. of Fish and Wildlife.

We had a lot of difficulties with the video-conferencing. We are going to have to start looking at other options.

#### Review of Action Items:

The following outstanding action items are based on issues that were brought up at the 10/17/2008 meeting. Today's meeting and status report focused primarily on items in process. For a complete list of action items, previous status reports, and other WA-Trans material, go to:

http://www.wsdot.wa.gov/mapsdata/TransFramework/steering.htm

- The discussion of segmentation is put off until research and decisions are completed regarding multi-level linear referencing,
- Holly reported that the Seattle Mapping Project is a geological program and may not be appropriate.
- Begin and end points discussed and decided upon below,
- Getting Pend Orielle County into WA-Trans is part of the USGS proposal Ian and Tami are developing,
- Tami is meeting with Michelle Blake and Jordyn Mitchell (GIS Data Stewards at WSDOT) to begin an inventory of data rather than working with Census, although we may work with Census to validate.
- The draft classification for alleys and driveways can't go any farther until local governments who would use and provide that information give us more input. We can still look at what CRAB has for those classifications.

#### Action Items

Tami will work with Michelle and Jordyn to perform inventory of readiness and willingness of counties to provide data to WA-Trans statewide implementation.

## II. Points in the WA-Trans Database

There is a problem with "begin" and "end" points in WA-Trans. Currently, these points don't provide the functionality we had thought they would. We thought they would indicate directionality. The data being provided does not have points, and isn't digitized in such a way as to support the correct implementation of points. FME may provide a solution for us. Michael has identified several solutions. (See Appendix A for "WA-Trans Begin and End Point Issue" document.) The goal of the document and discussion is to have some ideas on what criteria would be advisable to follow in regards to segment end-points. It looks likely we may have to create routes. Who determines what the routes are? How do we determine what they should be? Right now we are not maintaining begin and end points.

Dave Rideout shared that basically we are dealing with the fact that roads don't have one direction, they have address directionality, they have directionality based on linear referencing system, and lanes allow for multiple directions. Spokane County has stripped off directionality and have an address feature set, route feature set, milepost feature set and then they generate what they need on the fly. Pierce County does something similiar. Michael paraphrased Dave's point that there are ways to use the geometry without dealing with the directionality. You can track it all. Strip the geometry down to core geometry and associate the different data sets to that geometry and Spokane County uses topology to do this. Digitization is fairly random. It really depends on what the person inputting the data was focused on what type of business use they were doing at the time (address, route-milepost).

Michelle shared that points can serve the purpose of calibration of the geometry at intersections. She identified a couple of business rules for the points. Allows for distance from intersection so we could do calibration that way and another is so we can expand the function to support network functionality.

Michael referred to the data from the points WA-Trans generated as "bad". We deicded not to use the term bad, but to say that they weren't providing the information we had intended. It is difficult to model. Dave's sense is that this is a preliminary rumbling of issue that will arise when we put both addresses and route-milepost together. Michael pointed out that each county has generally created their data as an island. But if we are starting to create routes we have to change things. WSDOT has everything going in one direction. We have stopped calling the points and beginning and end of the segment. We don't use directionality.

Michelle proposes more calibration points using the reference points. Michelle proposes moving some of the mile-point information into some of the reference points instead.

Michael asked if we include routing how do we get the routes?

Tami pointed out that WA-Trans is to provide the building blocks for others to use the data for a variety of purposes. The question really is what are those necessary building blocks to make the data the most useful to the most groups at the most reasonable cost? Bob wondered how we would know which segments were connected to which segments? Maybe we need to start looking at how we know what we are doing.

Ian's says a lot of routing systems for various types of public transportation are so dynamic that it is almost simpler to build the stuff separately on top of the same network.

In summary: Michael will go with solution one and three in the document, which are to consider how we create points and do some research on what we might need asnd how we use and create them. We are not going to keep the points right now. We will continue to look at possibilities including FME. Maybe we can automate some of this to create better points in the interim. We will look at how to create segments. Tami reminded the group that keeping in mind the distance from intersection was a critical business need for city data. The whole routing thing needs to be addressed. How we do that is critical. How we manage connectivity is related. Action items: change standards and business rules regarding points.

#### Action Items

- Michael will change standards and business rules regarding points.
- Michael and Bob will work with Michelle to make sure the research and decisions made regarding points cover handling the business needs (high priority particularly).

# III. <u>Change Detection Requirements for Data Providers and Data Users</u>

Michael has created high-level requirements with a focus on data providers and users. The Puget Sound PAC provided much of the input. (See Appendix B for "WA-Trans Change Detection High-Level Requirements 10/15/2007".) Many of the requirements not yet identified are specific to the WA-Trans Project and won't involve the committees, except in an advisory capacity. Bob Grabhorn, the contractor we hired, will be completing these

requirements and turning them into detailed specifications. A decision will be made to buy and/or build.

Michael explained that in creating history of data we can't make wholesale changes so what we want to do is only apply the changes necessary to maintain the current data. We want to go back and see what it was historically in the transportation network. Most users are not getting back their own data but getting back data from various providers. Thus the creation of a change log for data users is part of these requirements.

Allyson suggested that we look at what was done by Shawna Ernst regarding development of the Pend Orielle County dataset. Ian identified that maybe the translator could export a report on changes. He also reported that Pend Orielle County had multiple data sources that didn't relate to each other very well so they had to figure out a method to flag changes. It would be worth speaking with her about it.

**Decision**: There was no further feedback so it will be considered that these requirements are acceptable to the data providers and data users.

#### Action Items

Bob will speak with Shawna Ernst regarding the work done with Pend Orielle County.

## IV. Use of Dates in the WA-Trans Database

Everyone was provided with a section from the standards with the data attributes described. On the back is a diagram of the databases WA-Trans will be working with. (See Appendix C for the dates and database information.) Michael referred to the database and wants to understand how these dates go across the database. Right now the dates have no direct relationship to the provider. Then the question arises, what does that date mean then? The date probably should be the date it was put into the WA-Trans production database. Right now it is based on WA-Trans processing dates. Michael is proposing identifying the dates as WA-Trans processing dates and that we use them for our internal process. But this leaves a gap. Michael asked if we proposing to add provider specific dates. We probably do need them. Michael proposes:

- 1. Make the top four dates in the list internal to WA-Trans.
- The bottom dates are unclear as well. (We need to clarify definitions)
- 3. Maybe instead of adding dates we should use the metadata.

The top four dates would be identified as WA-Trans dates and the bottom three date are provider specific but uncertain to be filled out.

Michael proposes addressing these dates from a fresh perspective. Maybe there is something different in the process to determine the history and create something different. The biggest purposes of dates external to WA-Trans is when something has changed and how history is managed.

You need the process dates for workflow internally. They may be the only dates we have. Change detection date is different and the user is interested in that.

Dave Cullom suggested that with the metadata record stored in the data model we don't want a lot of redundancy between the two. This becomes especially true regarding feature level metadata.

#### Action Items

- Michael change the description of the "Segment Create Date", "Segment Update Date", "Segment Validate Date" and "Segment Retire Date" to make them internal to WA-Trans processing.
- Michael, Bob and Michelle will consider the bottom three dates from a new perspective to determine if and how we can get provider specific information into WA-Trans and how we should use these dates accordingly.
- Michael, Bob and Michelle will consider the metadata as part of the process/solution.

## V. <u>Definitions (WA-Trans Dictionary Draft Version) Review</u>

Holly and David (before David left the project) developed a first draft definition document. The steering committee provided the following feedback on that document:

- Use the WSDOT Data Catalog definitions where possible for WSDOT specific definitions (ex. ARM).
- Missing the RRQ/RRT related roadway type and related roadway qualifier
- Change ESRI Shapefile "developed" by ESRI (can be used by many)

- Linear Referencing Systems (segments do not have to be connected). (GIS segments identified as part of a route). Andy Everett has defined this for WSDOT.
- Tami told Holly to expand on the data catalog to create more simplistic
  definitions for specific types of communications. Don't just replace the
  definitions with the WSDOT data catalog but fill them out from it where
  appropriate.
- Right-of-way needs to be defined in terms of the roadway.
- CAD has two definitions. Both of them need to be included. (Computer Aided Drafting/Design, or Computer Aided Dispatch).
- The definition for local road doesn't really define the functional definition. Pat provided an alternative - roadway that is owned and maintained by a local agency.
- XML needs to be defined.
- Add E-911 (enhanced 911).
- Add geoprocessing.
- Remove JPG, GIFF, BMP
- Add Geodatabase
- Reference Point Mobility definition (check some of these out in terms of this.)
- Add "SR".
- Add Versioning.
- Add our partner acronym WDFW (Washington Dept. of Fish and Wildlife)
- Define Primary and Secondary Reference Points.
- Zone has multiple definitions and they may need to be identified.

In general the completeness of the document was complemented.

#### Action Items

Holly will make the identified changes in the document as described above.

## VI. Portals Report

Michael provide an update on the development of the Data User and Data Provider Portals. It could be being installed as he speaks. Latitude Geographics is installing Geocortex Essentials on the WA-Trans servers. Next week they will be working on the WSDOT branding. Starting next week the Data User Portal will be available to test with King and Pierce County. Right now we are internally facing only. We can't have someone test it outside yet. Once we have the configuration done we will finish testing and try to get it complete and get the security done for outward facing. Then we work on developing specifically to our requirements. The data provider portal will probably be up around April. As soon as we go outward facing we can have data providers give us data. A specific interface will be created within the next two or three months. We anticipate being done early summer. At that point we will know how the portals work with our data. We then have to incorporate a lot of other processes.

## VII. Translation Out of WA-Trans Report

Andy provided an update on the translation out of WA-Trans. Andy got an updated translation from of WA-Trans that included changes that PSRC cares about. He had the wrong projection the first time. The changes came through since then and everything looks good. He was pretty enthusiastic about the results. He was able to take the pilot dataset and judge it against the regional dataset and it was relatively easy to find the differences between PSRC's network for the roadway portion only. He hasn't completed the actual cross-county testing results yet.

Andy wants to incorporate the pilot roadway network into the PSRC database. He thinks the translation in the state it is in now looks pretty do-able for him. One of the central issues in the cross-county check is that there has to be one and only one junction included in network configuration of the data. That means the agreement point is the only point in there. This requires a selection from the translation using flagged agreement points to select one unique. We can use this to create a geometric network across the two counties.

The one item missing is global identifier. He would like the WA-Trans GUID added to the translator. They have included that in an updated schema of their own. We can give PSRC the use of the GUID until the database is stable and Change-Detection and Change-Management are done.

## VIII. Close, Next Meeting

Tami provided a one-page brief project description. This is short executive summary developed at the request of Brian Malley of the Benton-Franklin COG. It can be used by everyone if they want to provide a brief project outline and status.

The next meeting is May 8 (Thursday) from 9 a.m. - noon in Olympia with video-conferencing.

#### Action Items

Tami will investigate options to the video-conferencing.

# WA-Trans Begin and End Point Issue 02/5/2008

#### **WA-Trans GIS Application Independence**

WA-Trans is designed to facilitate the use of specific non-spatial data in order to provide building blocks which can be used to create spatial transportation data. The concept behind the need for non-spatial information in WA-Trans is to create GIS application independence. With this design WA-Trans can provide building blocks for users that can form that basis of accurate spatial transportation data in their systems. The design making this possible was based on the idea that WA-Trans would have segment end points.

#### **Segment End Points**

Segment end points are explicitly maintained in WA-Trans to allow for non spatial queries and processes. The points were included in the database design to facilitate two important functions for non spatial use:

- 1. Connectivity of segments to allow for route creation and calibration,
- 2. Directionality to facilitate route creation and relate to the directionality indicated by LRS and Addressing descriptions.

Each created segment end point is stored as a "begin" and/or an End point for segments in the segment descriptions tables.

#### Assumption

Segment end points will connect to an adjoining segment by being related as a "begin" point of one segment and an End point of the adjoining segment. For **non spatial queries** this will provide <u>connectivity and directionality</u> of the segment or set of segments.

#### Problem

The segment end points in WA-Trans currently will not allow for connectivity or directionality using non spatial queries.

Segment end points are known as Reference Points in WA-Trans. A Reference Point can be a segment end point or some other point. So far non of the data providers WA-Trans has worked with maintain explicit segment end points in their systems and therefore they have not provide this data to WA-Trans. To accommodate this WA-Trans has created provider data reference points..

To create reference points during translation WA-Trans looks at the geometry of the segment and creates points for both segment nodes. A "begin" or "end" reference point is determined by the geometry and the directionality is dependent upon the way a segment was digitized. Not all segments in a specific route are digitized in the same direction. There are also directionality differences when connecting various providers' data. The results of this method of point creation

are: There are many instances where a "begin" point is not the "end" point of the adjoining segment.

- 1. There are many instances where the adjoining segment is connected by two Begin points or two "end" points.
- 2. When connecting two different providers' data the connecting segments at borders usually connect by two "end" points.
- 3. There is little to no relationship between the "begin" and "end" point references and the LRS or address information in the WA-Trans segment description tables indicating directionality or connectivity. For example the "begin" and "end" points may indicate directionality different than the LRS or the Address information.

The creation of reference points which support the underlying assumption above and then applying the "begin" and "end" point relationships to those segments involves substantial overhead during the translation process.

#### **Software Independence**

Independence from specific GIS has not been addressed in this document. This is an important aspect of WA-Trans that needs to be discussed in detail. It has been suggested that segment points are a method of helping create software independence. There are systems that use explicit points and systems that do not, both resulting in similar transportation functions. Unfortunately it has not been demonstrated that either process is independent, or can be independent of GIS software in order to be useable. Before it can be determined what we gain or loose by not including points in WA-Trans we need to:

- Determine what we actually mean by independence from specific GIS software for WATrans.
- Determine what begin and end points will represent in WA-Trans? What they represent now is not what was intended.
- Are there other methods to do what begin and end points are intended to do?
- Determine if the explicit begin and end points direct WA-Trans towards software independence, or are just more data. Neither independence nor just more data is necessarily good or bad, but depends on if the application of that process furthers the goals of WA-Trans for an acceptable cost and effort.

#### Conclusion

The current method of creating and storing segment points in WA-Trans does not result in data that can be used to create connectivity or directionality using non spatial queries. The goal to design of WA-Trans to facilitate GIS application independence is not in question. The current method to create point data does not serve the purpose of the GIS application independence design.

The WA-Trans standards are descriptive for what "begin" and "end" points will do regarding directionality and connectivity. It has not been demonstrated: that our design is software independent, and, that there may be alternatives to explicit points to achieve this independence. Lacking are adequate descriptions of the attributes necessary for GIS application independence.

I have included the applicable definitions from the WA-Trans Standards and the Data Characteristics Standards (See Appendix A).

#### **Possible Solution 1**

Determine an acceptable method of creating "begin" and "end" points for provider data that will meet the WA-Trans standards.

- a. This will involve some technical expertise.
- b. This will require we do not store points in WA-Trans until we determine a method.
- c. This will involve deciding what to do with segment direction at organizational boundaries.

#### The advantages are:

- A. We will be able to realize GIS application independence as anticipated.
- B. We will be able to create points at any point in time. We have agreed that we will not try to meet WA-Trans segmentation standards at this time.

#### The disadvantages are:

- A. We will not be able to store "begin" and "end" points until we determine a solution.
- B. We may no realize a complete GIS application independence in the near future.
- C. Until we create the points we will not be meeting WA-Trans standards. We have agreed that we will not try to meet WA-Trans segmentation standards at this time.
- D. The cost of doing this may exceed any determined benefit of being GIS application independent.
- E. We may require a different fundamental database design to meet standards.

We recently sponsored an FME training class. One of the trainers has been working with WA-Trans on our translations and may have a solution to this problem. We may be able to automate much of this solution. The one thing necessary for this solution is the creation of routes. This will allow us to apply direction and assure when we create points we will have begin and end points in their appropriate location. To create routes Wa-Trans will need guidance from either the Steering Committee and or the jurisdictions involved.

Using this process we will be able to create the points as we envisioned. We will need are some standards for creating routes. These standards will have to cover routes crossing jurisdictions, local roads in subdivision areas and freeway ramps running into local roads. I am sure I missed some.

#### **Possible Solution 2**

Do not store "begin" and "end" points for segment in WA-Trans

- d. This will mean we are not as GIS application independent as we anticipated.
- e. There are opinions that GIS application independence to the level we anticipated is not necessary.

#### The advantages are:

A. We will not have the overhead of creating and applying "begin" and "end" points to provided data. We are having problems with creating these points with very good data. We anticipate receiving data that is not as good and believe this effort will be costly.

The disadvantages are:

- A. We will not be GIS application independent as anticipated by this design.
- B. Future business benefits and cost avoidance opportunities may not be possible due to dependence upon specific GIS software.

#### **Possible Solution 3**

Research the GIS independence design with more vigor. There may be possible solutions that could be implemented. Currently we are very software dependent and it has not been determined that we can manipulate WA-Trans data independent of GIS Software to obtain results we now can get using ESRI GIS software. During the time this research is conducted no begin and end points will be created in WA-Trans. If it is decided they are necessary they can be added later.

## Appendix A

#### From the WA-Trans Standards

#### **Directionality**

We now include "From" and "To" Reference Points in the "Segment Description" and "Segment Road Address" tables. Both tables now directly link to the Segment table. Before, directionality was established in the "Segment Description" table and then related to the "Segment Description Road" table. This will account for the fact that routes and geocoding rarely share directionality.

#### Routes

To build routes for event placement and export, we plan to associate the "From" and "To" measures with the Reference Points, use the points to calibrate the routes, and use the "Set Direction As M" tool to switch the direction of the sketch/segment/arc to be the same as the direction of the measure values. This differs from the method we traditionally have used within WSDOT, the ArcToolbox 'Create Routes' tool, which is highly dependent on the internally stored digitized direction.

Topology/navigable network will be provided in WA-Trans through the following rules:

- a. A reference point (segment point), is located at the "begin" and "end" of each segment, (called from and to points)
- b. The segment direction is stored in the description table,
- c. The relationship between segments and reference points (segment points), is manifested in the description table.
- d. Connectivity is supported through the association of a single point (in the WA-Trans Database) with more than one segment. The point can act as both a from and to point based upon the description for each particular segment.

#### From the WA-Trans Data Characteristics:

Segment Description Begin Mile Point	Mile point describing the beginning of a segment as it relates to the segment description.
Segment Description End Mile Point	Mile point describing the ending of a segment as it relates to the segment description.
To Segment Point Identifier	Foreign key into the Reference Point table that identifies the "TO" Reference Point of a given line segment.
From Segment Point Identifier	Foreign key into the Reference Point table that the "FROM" Reference Point of a given line segment.
Segment Length	The linear measurement, as determined by the data provider, of the segment from one end point to the other. All measurements will be in US Survey Feet.

# WA-Trans Change Detection High Level Requirements 10/15/2007

#### **Change Detection**

Data providers will submit data to WA-Trans on a periodic basis. Changes between the current data submittal and the previous submittal are necessary prior to any updates of WA-Trans data. This document lists high level requirements for a change detection process.

#### **Background:**

A primary business need of WA-Trans is user access to current data. The temporality of WA-Trans data is important to many business needs identified by WSDOT and WA-Trans partners. In urban areas of Pierce County data changes 4 percent every 5 months.

#### **Change Detection:**

Detect any differences in data submitted to WA-Trans from a specified provider, with data previously submitted to the WA-Trans by that provider. Detect spatial and attribute differences.

#### **Purpose:**

There is no need to manage data which has been previously submitted and has not changed. WA-Trans will only use the detected changes during the WA-Trans data update processes. Changes to data will be documented in WA-Trans.

### 1.0 Detect Changes

- 1.1 Changes detected will include:
  - Spatial or geographic (e.g. re-segmentation, segment additions/deletions, re-alignment)
  - Attribute changes at the feature level (e.g. Address Range, Name of a Street)
  - Tabular attribute changes (e.g. Event changes)

#### 2.0 Update Database

- 2.1 WA-Trans will only update the production data with the detected changes.
- 2.2 There will be two types of updates:
  - 1. An update that requires changes to a record attribute values and does not require the retirement or addition of a new record. The unique identifier for this record will not change.
  - 2. An update that requires the retirement and/or addition of a new record. For example: for a record that is being retired and replaced with a new record, the unique id for the retired record is retired with that record and a new unique id is associated with the new record.
- 2.3 A record update that does not require a deletion and/or addition of a new record includes, but is not limited to:
  - 1. Attribute values within an existing feature, describing that feature, that have been changed.

- 2. Values for attributes which were not available previously.
- 2.4 The Update Date attribute, in each record, will indicate the last time any change was made to that record.
- 2.5 A WA-Trans Unique ID will be maintained in perpetuity.
- 2.6 Examples of updates and changes, from providers, that will require a record to be retired and/or added to WA-Trans includes, but is not limited to:
  - 1. A feature that has changed.
  - 2. A feature that has been re-segmented.
  - 3. A feature that is no longer in use.
  - 4. A new created feature.
  - 5. A feature that has been moved to a different location, like a re-alignment. This would likely involve a new feature being added and an old one being retired.
  - 6. New or changed descriptions/address ranges. This may not change the feature, but would affect a child record associated with that feature.
- 2.7 A record/feature will be retired, not removed, when being replaced by newer data. The Unique ID for that record is retired with that record.
- 2.8 The date a record is retired will be recorded in the Retired Date attribute.
- 2.9 There will be a decision process to determine if and what changes will be made to WA-Trans data.

#### 3.0 Change Log

- 3.1 A log of changes can be obtained by a user downloading data from WA-Trans. This log file will be referred to in this document as a "Change Log".
- 3.2 A Change log will categorize changes to include:
  - 1. Inserts, Spatial,
  - 2. Inserts, Attribute,
  - 3. Updates Spatial,
  - 4. Updates Attribute,
  - 5. Deletes, Spatial, NOTE: WA-Trans will not delete data in the WA-Trans database. For example a deleted segment found during change detection can trigger WA-Trans to "Retire" that WA-Trans segment, not remove it from the database (See 2.0 Update Database).
  - 6. Deletes, Attribute: NOTE: It is a WA-Trans policy not to delete data in the WA-Trans database. This policy is not clear when referring to just attribute information (for example changes due to accuracy corrections or errors).
  - 7. If data has changed, according to items 5 and 6, there needs to be an association between the old WA-Trans Unique ID and the new WA-Trans Unique ID.
  - 3.3 A Change Log will be grouped to reflect how a user may be updating data within their systems. For example, one way a user works would be to do updates in their systems within a small spatial area. A Change Log listing the changes in alphabetical order would not facilitate this work process. A Change Log could be grouped by a predetermined spatial area.

#### 4.0 DOWNLOADED DATA

Data downloaded by a user will generally reflect the data chosen by the user with a format of their choice. The attributes will likely be WA-Trans attributes except in instances where a special OUT transformation has been designed for that user. Even in those cases there may be WA-Trans attributes associated with that data.

WA-Trans will maintain perpetual identifiers and attribution necessary for the WA-Trans database to work effectively. Some of those attributes may be helpful to a user who regularly downloads data, especially when that data is from specific areas. PSRC has specifically asked for the WA-Trans GUIDS to be included in their downloads.

- 4.1 Attributes to be included in data downloaded by a user are: (Note this list is just starting to be formulated. More input is needed)
  - The WA-Trans Unique ID (GUID)

#### **5.0 CHANGE HISTORY**

This area needs much more clarity. The requirements below have been revised after further meetings. There will be additional requirements. The existing ones still need confirmation and refinement.

History in this context is referring to the changes to data based on WA-Trans processes and updates from providers. This is not referring to the temporal history of WA-Trans data.

The SQL database has change log files that can track the changes in the database. The ESRI SDE Versioning is also a method to track changes and move between different versions of data. It is likely that either one or both of these functions will be leveraged to meet the history requirements listed in this section.

- 5.1 Users would like to access a log file listing changes to data they have downloaded from WA-Trans.
- 5.2 The temporality of these changes will be maintained in WA-Trans for a time period, yet to be determined. One time frame mentioned was 7 years.
- 5.3 The changes most important to the users are the most recent, possibly going back a year.
- 5.4 Changes older than a year could be accessed as historical or archival data.
- 5.5 Change history date ranges will be selected by the user. For example a user may be interested in changes over a period of several weeks, or changes over several months. The ability to reply to a lawsuit request was mentioned.
- 5.6 Change history logs will require the recording of:
  - Who triggered the change, (e.g. WA-Trans due to standards, a provider change).
  - Since there could be multiple changes based on several providers, everyone who triggered a change will be recorded.
  - What kind of change (e.g. Geometry, attribute).

## Segment

Attribute Full Name	Data Type	Description	
Segment Identifier	CHAR(36)	Surrogate Key. A GUID generated by database processes upon insertion of a record.	
		It is used to uniquely identify a Segment record within the database.	
(R) Provider Record Identifier	VARCHAR(9)	Unique identifier assigned by the Data Provider and used in their local systems. This identifier is stored in WA-Trans for reference to the original Data Provider attributes schema.	
( <b>R</b> ) Primary Flag	BOOLEAN	Indicates this is the preferred segment for a particular geometry. Other segments can be included in the database, but will be considered alternatives and not preferred.	
(R) Segment Create Date	DATE	Date assigned to the segment that indicates when the segment data was created.	
Segment Update Date	DATE	Date assigned to the segment that indicates when the segment data was updated.	
Segment Validate Date	DATE	Date assigned to the segment that indicates when the segment data was validated (verified).	
Segment Retire Date	DATE	Date assigned to the segment that indicates when the segment data was retired.	
Segment Object Code	CHAR(1)	Object code that indicates a particular piece of data is a segment. (FW-part of Trans. Segment ID).	
Segment Length	DECIMAL(10,3)	Linear measurement of the segment from one end point to the other as determined by the Data Provider. All measurements will be in US Survey Feet.	
Horizontal Accuracy Measurement Method Identifier	INTEGER	Foreign Key identifier that relates to the table containing the horizontal accuracy and measurement method applicable to this segment.	
(R) Infrastructure Owner Identifier	INTEGER	Foreign Key that relates to the owner of the physical infrastructure.	
(R) Infrastructure Maintainer Identifier	INTEGER	Foreign Key that relates to the entity responsible for maintaining the physical infrastructure.	
(R) Data Steward Identifier	INTEGER	Foreign Key that relates to the entity, which is the Data Steward.	
(R) Status Identifier	INTEGER	Foreign Key into the Status Table. Domain (e.g., Operational, Retired, Proposed, Closed)	
Segment Ramp Flag	BOOLEAN	Indicates if a segment is a Ramp feature.	
(R) Mode Type Identifier	INTEGER	Foreign Key: Reference to the Mode Type of this segment. (See Mode Type)	
Segment Physical Inception Date	DATE	Date when the physical infrastructure, represented by the segment, was operational for use.	
Segment Physical Create Date	DATE	Date when the physical infrastructure, represented by the segment, was created / built.	
Segment Physical Retire Date	DATE	Date when the physical infrastructure of the segment was removed from operational use.	

Attribute Full Name	Data Type	Description
(R) Reference Data Set Id		Foreign Key into the Reference Data Set Table. Refers to the original source dataset.

## WA-Trans Provider Data Work Flow

03/20/2007

Basic Import of provider data.

Staging (Working) **Database** 

**WA-Trans Production User Ready Database** 

Basic Import of all the data and Agreement Points

A versioned database with work flow and topology processes, QA/QC and Manual Processes.

First **Transformation** using Raw data from the Data Provider

**WA-Trans** Loading

SQL / SDE

Puget Sound Pilot Phase I and One Road Pilot Phase I

Second **Transformation** 

Standard transformation processes, SQL Loads and possibly Model Builder

**WA-Trans** Staging

SQL/SDE

Puget Sound Pilot Phase I and One Road Pilot Phase I

**WA-Trans Production User** Ready

SQL/SDE

One Road Pilot Phase I

This is a loading database. The data provided to WA-trans is initially uploaded into this database using processes initiated through the WA-Trans Data Provider Internet Portal. This database will allow data that has passed initial QA/QC, but may not entirely meet WA-Trans standards and the more stringent QA/QC standards applied when being promoted to the staging database.

After data has been promoted to the staging database, integration processes will be performed, both vertical and horizontal.

Choices need to be made concerning which provider data is the best source for any particular feature.

Stringent QA/QC will be performed to make sure the WA-Trans standards are met and connectivity between jurisdictions is maintained.

Conflation of disparate datasets may be necessary to ensure all data from the selected sources will be stored as expected and available to a data user

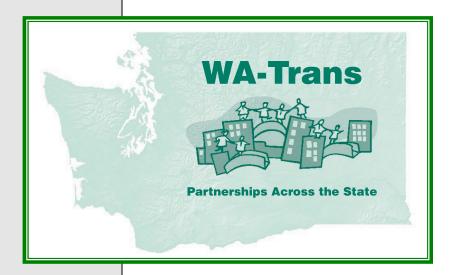
The data in this database is user ready. There will be spatial views and a standard formatting of data ready for download. This is the database the WA-Trans Data User Portal will be accessing.

Final

**Transformation** 

Nightly / Periodic

Data Loads



# Dictionary of Terms for the Washington Transportation Framework for GIS

Version 1.0

The Source for Technical Terms and Definitions Used in the Washington Transportation Framework for GIS (WA-Trans) and Related Applications

Last Updated: February 6, 2008



## Glossary of Terms

## <u>A</u>

Accuracy (GPS)	The closeness in GPS measurement of a feature's position to its actual ground location.
Accuracy Targets	A measure of the quality of a GIS data set used in WA-Trans based on standards for:  • Spatial accuracy  • Frequency of update  • Percent of expected information in the data set  • Map scale of the source data used to create the data set
Adjustment	See: "Spatial Adjustment".
ADT	Average Daily Travel. The average number of vehicles that drive past a given road location in a day.
Agreement Point	A concordance between two or more parties who possess overlapping data sets and share data boundaries over the location of shared map features.
Anchor Point	A reference point on a GIS route that has a defined measure value (such as milepost 12).  See Also: "Linear Referencing".
ArcGIS	An integrated collection of GIS software products from ESRI.
ArcGIS Data Interoperability	An extension of the ArcGIS Desktop software, which allows users to work with data in different GIS data formats.
ArcGIS Feature Class	A collection of geographic features in ArcGIS that has the same geometry type, attributes, and spatial reference.
ARM	Accumulated Route Mileage. The calculated milepost on a Washington State route that includes changes in construction of the roadway.
Attribute	Generally, things that describe characteristics of a feature or entity.  As an example, the speed limit is an attribute of a highway.  Tables in a database contain information about entities called attributes.  See Also:
Average Daily Travel	See: "ADT".

## <u>B</u>

BLM	Bureau of Land Management.
BLM GTN	BLM Ground Transportation (Roads & Trails). See Also: "BLM".
ВМР	Bitmap file. A file extension that identifies the file as a graphic.

BMS	Bridge Management Systems
Boundary	A line that divides neighboring areas or jurisdictions.
Boundary Features	A feature described in a legal statement that marks an area's boundary.



Calibration	Applying reference measures to known road locations The value assigned to anchor points (also known as calibration points) is used by a GIS to create a linear referencing system on a route. See Also: "Linear Referencing System".
Centerline	A line that marks or identifies the center of a roadway, such as the painted stripe in the center of a two-lane road.  See Also: "Roadway Alignment".
Change Detection	A process that compares two versions of a data set and identifies the attribute values, geometries and measures that do not match.
Change Management	A process that implements changes to data using rules. Also a process that responds to and controls change in project scope, schedule or budget.
Clip	The process of using a GIS area like a cookie cutter to select other features located within the area.  See Also: "Feature" and "Overlapping Data Sets".
Coincident	Two or more GIS features that occupy the same area.
Common Boundary	A shared boundary that is agreed upon by neighboring jurisdictions.
Concatenate	Joining two character strings end-to-end.  Example: Concatenating "XX" and "OO" creates "XXOO".
Conflation	A set of procedures that aligns the features of two geographic data layers and then transfers the attributes of one to the other.  See Also: "Corresponding Features".
Connected Segments	GIS Line segments that join end-to-end as a continuous pathway.  See Also: "Network", "Route", and "Segment".
Connection	A point that joins two or more line segments.
Connectivity	A property that exists when two or more GIS line segments are connected.  See Also: "Route".
Conversion Points	Geographic points on the WSDOT GPS LRS data layer that are used to link related data to the WSDOT SR 24K data layer.
Coordinate System	Specifies the location of features using a reference system based on a defined datum and projection.
Coordinates	Position measurements (X, Y) used to map features in a coordinate

	system.
Corresponding Features	A feature that is shown in two or more GIS data sets. See Also: "Conflation".
CRAB	County Road Administration Board (Washington). This agency provides oversight to the county road departments and is the custodian for county road log data.
CAD	Computer Aided Design. A combination of software and hardware used to create engineering, architectural and product designs.
CADD	Computer Aided Design & Drafting. See:" CAD".
COG	Council of Governments (Washington). Regional Transportation Planning Organization for areas with populations too small for Federally required Metropolitan Planning Organizations (MPO).
Crosswalk	A spreadsheet and process that relates feature attributes in a Data Provider's GIS to the corresponding attributes in the WA-Trans schema.

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CSDGM	Content Standard for Digital Geospatial Metadata is a US Federal standard for metadata. The standard supplies information about the format and availability of a geographic data set, its fitness for an intended use and how to acquire the data.
СТМ	The Cooperative Topographic Mapping Program of the United State Geological Survey provides geographic data and maps and is responsible for developing and maintaining The National Map.

## <u>D</u>

Data Lavora	GIS data sate that are displayed on the same man
Data Layers	GIS data sets that are displayed on the same map.
Data Maintenance	A process used to update the attributes, geometry or linear referencing system in a record, or to insert into or delete records from an existing data set.
Data Provider	An organization, agency or jurisdiction which is best capable of providing information about a mode of transportation data to WATrans.  See Also:" Vertical Integration" and "Horizontal Integration".
Data Schema	A description of the data structure for a feature or entity.  See Also "Attribute".
Data Set	(Also Dataset) Transportation information that is stored in a database, table or GIS.
	See Also: "Geographic Data Set".
Data Steward	The person or authority that maintains a GIS data set according to WA-Trans standards.
	See Also: "Data Provider".
Data User	A person or organization that accesses the data in a GIS.
Datum	The calculated shape of the earth that is used as a reference for horizontal and vertical locations.
	See Also: "Coordinate System".
DBF	A generic database file type (.dbf extension).
DGN	A Design file format (.dgn extension) used in CAD applications. See Also: "CAD".
DNR	See: "WA DNR".
DSA	Data Sharing Agreement. A legal document made by the owners of GIS data that specifies the data and how it is shared between them.
Dual Carriageway	A roadway in which the two directions of traffic are separated by a central barrier or strip of land.
Dual Centerline	A roadway representation that has two lines, one in the center of each direction of travel. See: "Dual Carriageway".

DXF	Data Exchange File (.dxf extension), a two-dimensional graphics file format supported by virtually all PC-based CAD products. It was
	created by AutoDesk for the AutoCAD system.
	Autodesk Drawing Interchange File

# $\mathbf{E}$

Edge Stripe	Solid painted line that divides the lane from the shoulder of the road. This is also called a fog stripe.
Endpoint	(Segment) The points on either side of a segment. See Also: "Segment" and "Geometric Direction".
Entity	Related to databases, a thing that can be identified and described. A road is one kind of entity which is identified and described in WA-Trans. Entities become tables in databases. See Also: "Attribute".
ESRI	ESRI was founded as "Environmental Systems Research Institute" in 1969 and is a vendor of GIS software.
ESRI Shapefile	A GIS data format for vector data (point, line or area) used by ESRI software. A single shapefile is a group of three or more files of the same name which have different extensions ".shp", ".shx", ".dbf", and others.  See Also: "Shapefile".
Event	A point at a measured location on a route, or a line along part of a route that extends from a start measure to an end measure, using a linear referencing system.  See Also: "Geocoding".
Excel	Spreadsheet software created by Microsoft, used to store information in columns and rows, which can then be organized and/or processed. The file extension is .xls.
Extent	The geographic area of a spatial data set. This is often measured by coordinate values that map the area's extreme north, south, east and west points in a coordinate system.

# <u>F</u>

Feature	A physical object found in a landscape, such as a road, river, or mountain that can be shown on a map.  See Also: "Map Feature".
Feature Alignment	Process of editing GIS data about map features so that the features connect or adjoin.  See Also: "Spatial Adjustment".
Feature Class	In ArcGIS a similar group of features that have the same geometry and are described by the same attributes.  See Also: "Entity".

Feature Crossings	The intersection of two features on a map. One example of this is a road intersection.
Feature Level Metadata	An attribute in a feature class which contains Information about the quality of the data collected for a feature.  See Also: "Metadata".
FGDC	Federal Geographic Data Committee
FIPS	Federal Information Processing Standards Codes for states, counties, and named populated places.
FME	Feature Manipulation Engine (FME) Safe software application used for GIS data translation and conversion between data formats and coordinate systems.
FMG	Framework Management Group See Also: "WAGIC"
Fog Line	A line painted on the edge of a paved road that separates a vehicle lane from the shoulder.



GBF	Geographic Base File
GDT	Geographic Data Technology. Commercially available integrated roadway data now owned by TeleAtlas North America.
Geocoding	<ol> <li>The process of assigning a coordinate location to a place, street address or street intersection.</li> <li>Address – Features with address information may be points, lines, or blocks (areas). The geocoded location for a point is the point coordinates, line features with address ranges are interpolated to determine the location of any possible address within the range, while area features may yield a geocoded location of the block face or center depending on the method used.</li> <li>Intersection – Assigns a coordinate to the point where two streets cross.</li> <li>Milepost – Assigns a coordinate location to a place on a road or part of a road using a Linear Referencing System.</li> <li>See Also: "Linear Referencing System" and "GNIS".</li> </ol>
Geographic Data Set	Spatial data used in a GIS See Also "Feature class".
Geographic Information System	See "GIS".
Geographic Location	The coordinate system values that are used to map a feature.
Geomedia	Intergraph GIS software
Geometry	The properties of points, lines, areas and volumes. In a GIS, geometry includes the properties and measurements of

	shapes (points, lines or areas) and their spatial relationships.
Geometric Direction	Route – (A continuous direction, increasing toward the highest value on a route used in a linear referencing system )     Segment – (Increases from start point to end point)
Geospatial Data	Data about the properties and location of a physical area and features in the area.
	See Also: "Attribute", "Coordinate System" and "Feature".
GIF	Graphics Interchange Format (.gif extension), a file format for raster (pixel based) data.
GIS	Geographic Information System: A system that includes people, software & hardware, spatial & non-spatial data, and documentation.  See Also: "Spatial Data".
GIS Data Set	See: "Geospatial Data".
GIS Data Set Boundary	See: "Boundary" and "Extent".
GIT	Geographic Information Technology subcommittee of the Information Services Board (ISB) for the State of Washington.
GNIS	Geographic Names Information System
	A Federal standard identifier for geographic place names.
GPS	Global Positioning System: A minimum of 24 earth – orbiting satellites which transmit signals used to calculate the ground position coordinates of a GPS receiver.
GPS Centerline	See Also "Centerline".
GUID	Global Unique Identifier: Automatically generated unique identifier used to relate data between tables in the WA-Trans Framework.

## <u>H-I</u>

Horizontal Integration	The process of connecting and/or conflating the transportation data from adjoining or overlapping providers in a GIS.
HOV	High Occupancy Vehicle A vehicle with a driver and one or more passengers may use the HOV Lanes on a highway.
Integration	Creates a unified view of data originally from different sources.
Intersection	The point where two transportation segments cross.
IRICC	Interagency Resource Information Coordinating Council.
ISB	Information Services Board See Also: "GIT".

# J-K-L

JPG or JPEG	Joint Photographic Experts Group (.jpg extension) file format for raster (pixel based) data.
Lane	The part of a road used by a single line of vehicles.
Length	<ol> <li>provider – (The ground distance on a feature measured by a data provider)</li> <li>software – (The distance of a line segment measured by GIS software)</li> </ol>
Line	The segment or curve between two points. See Also: "Line Segment" and "Segment".
Line Segment	See: "Segment".
Linear Feature	A feature that can be represented on a map by a line.
Linear Referencing	Using relative positions on a measured linear feature to map a geographic location.
Linear Referencing Method	Measurements at points on a route which are used as reference locations by a Linear Referencing System. See: "LRM".
Linear Referencing System	A linear measurement system on connected GIS segments which increases toward the highest measure value.  The LRS may be based on linear distance and direction from a reference location or the proportional distance between anchor points.  See Also: "Multiple Linear Referencing System" and "LRS".
LLRS	Linear Location Reference System See "Linear Referencing Systems".
Local Road	Roadways with a Right-of-Way owned by a local jurisdiction.
Location	<ol> <li>GPS – (The position calculated by a GPS receiver using signals transmitted by GPS satellites)</li> <li>Physical – (The ground position of a feature)</li> </ol>
LOS	Level of Service- Ranks the congestion and performance of the Transportation system from A (best) through F (worst).
LRM	See: "Linear Referencing Method"
LRS	See: "Linear Referencing Systems".



Мар	<ol> <li>Used as a noun: Displays a part of the earth's surface, seen from above, where a distance on the map corresponds to a distance on the ground. Symbols on the map represent features in the map area.</li> <li>Used as a verb: The process of locating features on the earth's surface.</li> </ol>
Map Feature	A representation of a geographic feature that has geometry and is described by attributes.  See Also: "Feature" and "Attribute".
Map Symbol	A graphic that represents a point, line or area feature on a map. Symbols may be simple (dot) or descriptive (airplane).
MDB	ESRI Personal Geodatabase format or Microsoft Access database file (.mdb extension). A geodatabase contains ArcGIS feature classes and tables.
Metadata	A file (.xml extension) which describes a geographic data set using the FGDC metadata standard.  Generally, data or information which describes other data or information.
Milepost	<ol> <li>Event placement: The linear measurement assigned to a geographic location on a state route.</li> <li>Physical: A sign along the state route with the milepost value at that location.</li> </ol>
Mobility Data	Inventory of maintenance performed on county roads in Washington, maintained by CRAB.  See Also "CRAB".
Model Builder	Model Builder is an interactive environment in ESRI's ArcGIS software that provides a graphical modeling environment for designing and implementing geoprocessing models, which may include tools, scripts, and data.
Mode	A method of transportation such as road, rail or ferry.
MPO	Metropolitan Planning Organization (e.g., COG, SRTC, etc.)
MSAG	Master Street Address Guide (E-911 data)
Multiple Geometry	A transportation feature in a GIS which has more than one representation.
Multiple Linear Referencing Systems	Plural Reference measurements from many LRM are used to find locations on a route.

## N

NAD	North American Datum: Reference systems used in North America to approximate the shape of the earth.
	See Also "Datum".

National Map (The)	The National Map is a consistent framework for geographic knowledge needed by the nation. It provides public access to high quality, geospatial data and information from multiple partners to help support decision making by resource managers and the public. See: "TNM".
NCHRP	National Cooperative Highway Research Program: Investigates solutions for problem areas in highway planning, design, construction, operation, and maintenance nationwide.
Network	A connected set of lines with point intersections that represent transportation modes.  See Also: "Route".
NHS	National Highway System: Includes roads and connectors in the interstate, principal arterials and strategic highways systems, and connections to other modes of transportation.
Node	A point at the intersection of line segments in a network.
NSDI	National Spatial Data Infrastructure: The technology, people and policies needed to promote the sharing of USA geospatial data.

# <u>O-P-Q</u>

One Road Pilot	The One Road Pilot is focused on developing prototype software utilities to support sharing and integrating GIS data. It will represent the best transportation data available from various sources, include mechanisms to improve over time and provide data which can be shared with GISDC partners and other organizations at the least cost with the least restrictions.
	See Also: "Puget Sound Pilot".
Orthophoto	An aerial photograph from which distortions have been removed. An orthophoto has the same scale throughout and can be used as a map.
Orthophotography	The process of creating images from aerial photographs and removing the distortions.
Overlapping Data Sets	Geographic data sets that have an area in common. See Also: "Clip".
Pathway	Connected segments ordered by their position.
Persistent ID	A unique identifier assigned to a GIS feature or database record which is not changed.
Physical Infrastructure	The structures within a roadway.
Pilot Advisory Team	This committee is formed for the duration of a WA-Trans pilot. It

consists of the Project Manager, Pilot Technical Lead, WA-Trans Steering Committee Member(s) and Partner Representative(s).
Pavement Management Systems: Tracks pavement condition and performance and road maintenance requirements.
A point is a single object with a specific geographic location located using XY coordinates.
A feature that is represented on a map by a point symbol.
An area defined by a boundary.
A feature that is mapped using a polygon in a GIS.
A website which provides an access point to a project or data.
The process of transforming the three dimensional earth onto a two dimensional map. This process distorts one of the following: shape, area, direction or distance.  See Also: "State Plane".
Puget Sound Regional Council: An association of <u>cities</u> , <u>towns</u> , <u>counties</u> , <u>transit</u> agencies, <u>port districts</u> , <u>Native American tribes</u> and state agencies that develops policies and makes decisions about <u>transportation planning</u> , <u>economic development</u> and <u>growth management</u> in the four-county <u>Seattle</u> metropolitan area surrounding <u>Puget Sound</u> consisting of <u>King</u> , <u>Kitsap</u> , <u>Pierce</u> and <u>Snohomish</u> counties. The major MPO for the Puget Sound Region.  See Also: "MPO" and "COG".
WA-Trans Puget Sound Pilot is the first step in implementing the statewide transportation framework. It is geographically situated to test the implementation in an urban area made up of local governments with sophisticated GIS and data. Experience gained will be used in all future WA-Tran pilots and will be the basis for cost, labor estimates, and other project decisions. Documented business value will provide incentives for funding and participation in support of the overall project vision and objectives.  See Also:" One Road Pilot"
See: "Quality Assurance".
See: "Quality Control".
Processes that operate on data input, processing and output for the WA-Trans database. They compare the data to the project standards for: completeness, validity, logical consistency, topological consistency, referential integrity and spatial accuracy. See Also: "QA".
Control of the data produced by WA-Trans to ensure that it meets the project standards See Also: "QC".

# <u>R</u>

Ramp	A roadway used by vehicles to enter and exit limited access roads
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	such as freeways.
Reconcile	To make two or more apparently conflicting map locations for a feature consistent.  See Also: "Spatial Adjustment".
REO	Regional Ecosystem Office: Serves as staff to the Regional Interagency Executive Committee (RIEC) to support implementation of the Northwest Forest Plan (NWFP) in Northern California, Western Oregon, and Western Washington.
Representation	A simplified symbol used to display a feature on a map. See Also: "Centerline" and "Dual Carriageway".
Resolution	The smallest distance that can be mapped in a GIS. This distance depends on both the spatial accuracy of the data and the GIS software.
Right of Way	The boundary of a Roadway. Also, an area which provides access to another place.  See Also: "Roadway".
Road Log	A record of the road maintenance performed on county routes in Washington State.  See Also: "CRAB" and "Mobility"
Roadway	The ground area bounded by the Right of Way
Roadway Alignment	A line which marks the center of the roadway.
Roadway Feature	A physical feature which is near or on a road.
Route	A network pathway from a starting point to a destination point.
RRT	State Route Related Roadway Type - Related roadway type indicates a classification of a roadway associated with a mainline state route.

# <u>S</u>

Scale	The relationship between a distance on a map and the corresponding distance on the ground. In a map with a scale of 1:1000, 1 inch on the map represents a ground distance of 1000 inches.
SDTS	Spatial Data Transfer Standard. A set of standards used to transfer spatial data between different computer systems.
Seamless	A unified geospatial data constructed by integrating GIS data from many sources.  See Also: "Vertical Integration" and "Horizontal Integration".
Segment	Also called "line segment". A line or curve between two endpoints.  A part of a line bounded by two end points that contains every point on the line between its end points.  A line between two points; the endpoints. Many line segments may be connected to form a line.

	See Also: "Endpoint".
Segment Direction	Each ArcGIS segment has a start point, an end point, and a line or curve that connects them. The direction of a segment points from the start point to the end point.
Segment Mode	The mode of transportation associated with a particular GIS line segment.
Segment Properties	A GIS segment has spatial properties of shape, length, location and direction. In the WA-Trans database, the segment properties include related records that describe the segment.
Shapefile	See: "ESRI Shapefile".
Shared Geographic Location	A point used as a reference position for corresponding features in different data sets.  See Also: "Reconcile".
Snap	Spatially adjust GIS features so there is no gap between them
Spatial Accuracy	Correspondence between the mapped location of a feature and its correct location on the earth.
Spatial Adjustment	Change the location of GIS features to conform to a reference location.
Spatial Data	Any data that includes geographic location. This data is used by a GIS to locate and map points, lines, orthophotos, and polygons.
SRMP	State Route Milepost: The mile location assigned to a point on a Washington state route by WSDOT.
Stakeholder	Stakeholders are groups or individuals which have an interest in the outcome of a project. Typical WA-Trans stakeholders include Data Providers, Washington state agencies and organizations concerned with transportation data and reporting. There are many others unlisted here.
State Plane	State plane coordinate systems in each state are used to measure distance with a minimum of distortion. Each state is divided into zones of the required spatial accuracy.  See Also: "Zone".

# <u>T</u>

TIFF	Tagged Image File Format (.tif extension), a graphics file format for raster (pixel-based) data.
TIGER	Topologically Integrated Geographic Encoding and Referencing:  The US Census database with roads and ranges of street addresses.
Topology	Spatial relationships between features. For example, connected segments share an endpoint.
Transformation	Process that changes GIS data in a data structure to another structure, allowing data to be used in many different databases or GIS

	This can include changes in GIS coordinate systems, data structures, attribute values and other data and spatial changes.
Translation	The act of moving data from one data schema (a set of data and field definitions) into a different data schema.  See Also "Transformation".
Translation In	The process which translates the data set from a Data Provider into the WA-Trans Database schema.
Translation Out	The process which translates data from the WA-Trans Database into another schema.
Translator	Computer software that facilitates the import and export of data into different schemas.
Transportation Data	Information about the location and properties of roads, railroads and other modes of travel.
Travel Way	A pathway of connected GIS segments used by vehicles for a mode of transportation.
TRIPS	Transportation Information and Planning Support (WSDOT)

# $\underline{U}$ - $\underline{V}$ - $\underline{W}$

USFS	United States Forest Service: Manages public lands in national forests and grasslands
USGS	United States Geological Survey: Collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems.
USGS DLG	United States Geological Survey Digital Line Graph: The USGS format for digital vector representation of cartographic information.
USPS	United States Postal Service.
UUID	Universally Unique Identifier. See Also: "GUID".
Vertical Integration	Decision regarding which of the potential data sources is the data provider for a mode of transportation for a specific business need.  The integration of geographic data sets which have different spatial accuracies in a GIS.
WA DNR	Washington State Department of Natural Resources
WAGDA	Washington Geospatial Data Archive: Provides access and links to GIS data for the State of Washington and other selected areas
WAGIC	Washington State Geographic Information Council: Coordinates and facilitates the use and development of Washington State's geospatial information.
Washington Transportation Framework for GIS Project	A statewide transportation database of location-based transportation data for use in GIS across the state of Washington The framework data includes information about roads, rails, ferries, ports, aviation, and non-motorized transportation infrastructure.

	The data will be seamless, connected, consistent, and continuous between jurisdictions, boundaries, and other framework layers, and will be continuously improved Also known as "WA-Trans".
WA-Trans	See: "Washington Transportation Framework for GIS Project".
Washington State Geospatial Framework	The framework is geospatial data that is collected and maintained by many organizations in Washington State, which will be organized and managed cooperatively, and support the National Spatial Data Infrastructure (NSDI). The framework will include digital orthoimagery, elevation, transportation, hydrography, governmental units, and cadastral data. Framework participants will work together in partnership to develop common data management protocols and reduce duplication of effort.
WSDOT	Washington State Department of Transportation: Keeps people and business moving by operating and improving the state's transportation systems
WUTC	Washington Utilities and Transportation Commission: Their mission is to protect consumers by ensuring that utility and transportation services are fairly priced, available, reliable and safe.

# X-Y-Z

Zone	An area of a state which has a separate state plane coordinate system. Features in each zone of the state plane coordinate system
	must have a spatial accuracy of 1 in 10,000.